

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/47362

## A. CLASSIFICATION OF SUBJECT MATTER

IPC: F28F 9/04( 2006.01)

USPC: 165/173,174,175

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 165/173, 174, 175

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EAST search for restriction orifice in header/tube end of heat exchanger/evaporator/condenser

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| A          | EP 0228330 A1 (POITIER) 8 July 1987 (8.7.1987).                                    | 1-19                  |
| A          | US 5,632,329 A (FAY) 27 May 1997 (27.05.1997).                                     | 1-19                  |
| A          | US 4,724,904 A (FLETCHER et al.) 16 February 1988 (16.02.1988).                    | 1-19                  |
| A          | US 4,607,689 A (MOCHIDA et al.) 26 August 1986 (26.08.1986).                       | 1-19                  |
| A          | US 5,145,223 (REAVIS et al.) 16 May 1995 (16.05.1995).                             | 1-19                  |

☐ Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

12 June 2006 (12.06.2006)

Date of mailing of the international search report

29 JUN 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Allen J. Flanigan

Telephone No. (703) 308-0861

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

|  |  |  |
|--|--|--|
| Applicant's or agent's file reference<br>210_794PCT  | <b>FOR FURTHER ACTION</b>  | See item 4 below   |
| International application No.<br>PCT/US2005/047362   | International filing date ( <i>day/month/year</i> )<br>28 December 2005 (28.12.2005) | Priority date ( <i>day/month/year</i> )<br>02 February 2005 (02.02.2005) |
| International Patent Classification (8th edition unless older edition indicated)<br>See relevant information in Form PCT/ISA/237 |  |  |
| Applicant<br>CARRIER CORPORATION   |  |  |

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).
2. This REPORT consists of a total of 4 sheets, including this cover sheet.  
  
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input type="checkbox"/>            | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application   |

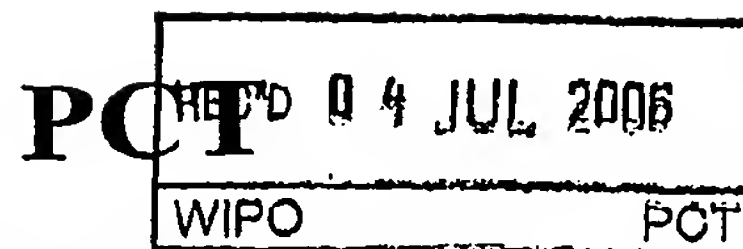
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

|   |  |
|---|--|
| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland<br><br>Facsimile No. +41 22 338 82 70 | Date of issuance of this report<br>07 August 2007 (07.08.2007)<br><br>Authorized officer<br><p style="text-align: center; font-weight: bold;">Dorothee Mülhausen</p> e-mail: pt01.pct@wipo.int |
|---|--|

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
WILLIAM W. HABELT  
101 SOUTH SALINA STREET  
4TH FLOOR  
SYRACUSE, NY 13202



## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

|  |  |
|--|--|
| Date of mailing<br>(day/month/year) <b>29 JUN 2006</b>   |  |
| <b>FOR FURTHER ACTION</b><br>See paragraph 2 below   |  |
| Applicant's or agent's file reference<br><b>210_794PCT</b>   |  |
| International application No.<br><b>PCT/US05/47362</b>   | International filing date (day/month/year)<br><b>28 December 2005 (28.12.2005)</b> |
| Priority date (day/month/year)<br><b>02 February 2005 (02.02.2005)</b>   |  |
| International Patent Classification (IPC) or both national classification and IPC<br><br>IPC: <b>F28F 9/04( 2006.01)</b><br>USPC: <b>165/173,174,175</b> |  |
| Applicant<br><b>CARRIER CORPORATION</b>  |  |

1. This opinion contains indications relating to the following items:

- |                                     |              |  |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the opinion   |
| <input type="checkbox"/>            | Box No. II   | Priority   |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability   |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention   |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited  |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application   |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application  |

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

|  |  |   |
|--|--|---|
| Name and mailing address of the ISA/ US<br>Mail Stop PCT, Attn: ISA/US<br>Commissioner for Patents<br>P.O. Box 1450<br>Alexandria, Virginia 22313-1450<br>Facsimile No. (571) 273-3201 | Date of completion of this opinion<br><b>12 June 2006 (12.06.2006)</b> | Authorized officer<br><br>Allen J. Flanigan<br>Telephone No. (703) 308-0861 |
|--|--|---|

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US05/47362

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/US05/47362

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

|                               |                    |     |
|-------------------------------|--------------------|-----|
| Novelty (N)                   | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |
| Inventive step (IS)           | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |
| Industrial applicability (IA) | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |

2. Citations and explanations:

Claims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger with tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and a plurality of flow restriction ports in a spaced series arrangement as claimed.

Claims 1-19 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
WILLIAM W. HABELT  
101 SOUTH SALINA STREET  
4TH FLOOR  
SYRACUSE, NY 13202

**PCT** RECEIVED 04 JUL 2006  
WIPO PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

|  |  |  |
|--|--|--|
| Date of mailing<br>(day/month/year) <b>29 JUN 2006</b>   |  |  |
| <b>FOR FURTHER ACTION</b><br>See paragraph 2 below   |  |  |
| Applicant's or agent's file reference<br><b>210_794PCT</b>   |  |  |
| International application No.<br><b>PCT/US05/47362</b>   | International filing date (day/month/year)<br><b>28 December 2005 (28.12.2005)</b> | Priority date (day/month/year)<br><b>02 February 2005 (02.02.2005)</b> |
| International Patent Classification (IPC) or both national classification and IPC<br><b>IPC: F28F 9/04( 2006.01)</b><br><b>USPC: 165/173,174,175</b> |  |  |
| Applicant<br><b>CARRIER CORPORATION</b>  |  |  |

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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### 2. FURTHER ACTION

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|--|--|---|

Form PCT/ISA/237 (cover sheet) (April 2005)

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US05/47362

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a. type of material

- ☐ a sequence listing  
☐ table(s) related to the sequence listing

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- ☐ on paper  
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- ☐ contained in the international application as filed.  
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3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:



WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.  
PCT/US05/47362

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

|                               |                    |     |
|-------------------------------|--------------------|-----|
| Novelty (N)                   | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |
| Inventive step (IS)           | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |
| Industrial applicability (IA) | Claims <u>1-19</u> | YES |
|                               | Claims <u>NONE</u> | NO  |

2. Citations and explanations:

Claims 1-19 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a heat exchanger with tubes having plural discrete flow paths connected to headers with connectors having inlet, outlet, and intermediate chambers and a plurality of flow restriction ports in a spaced series arrangement as claimed.

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